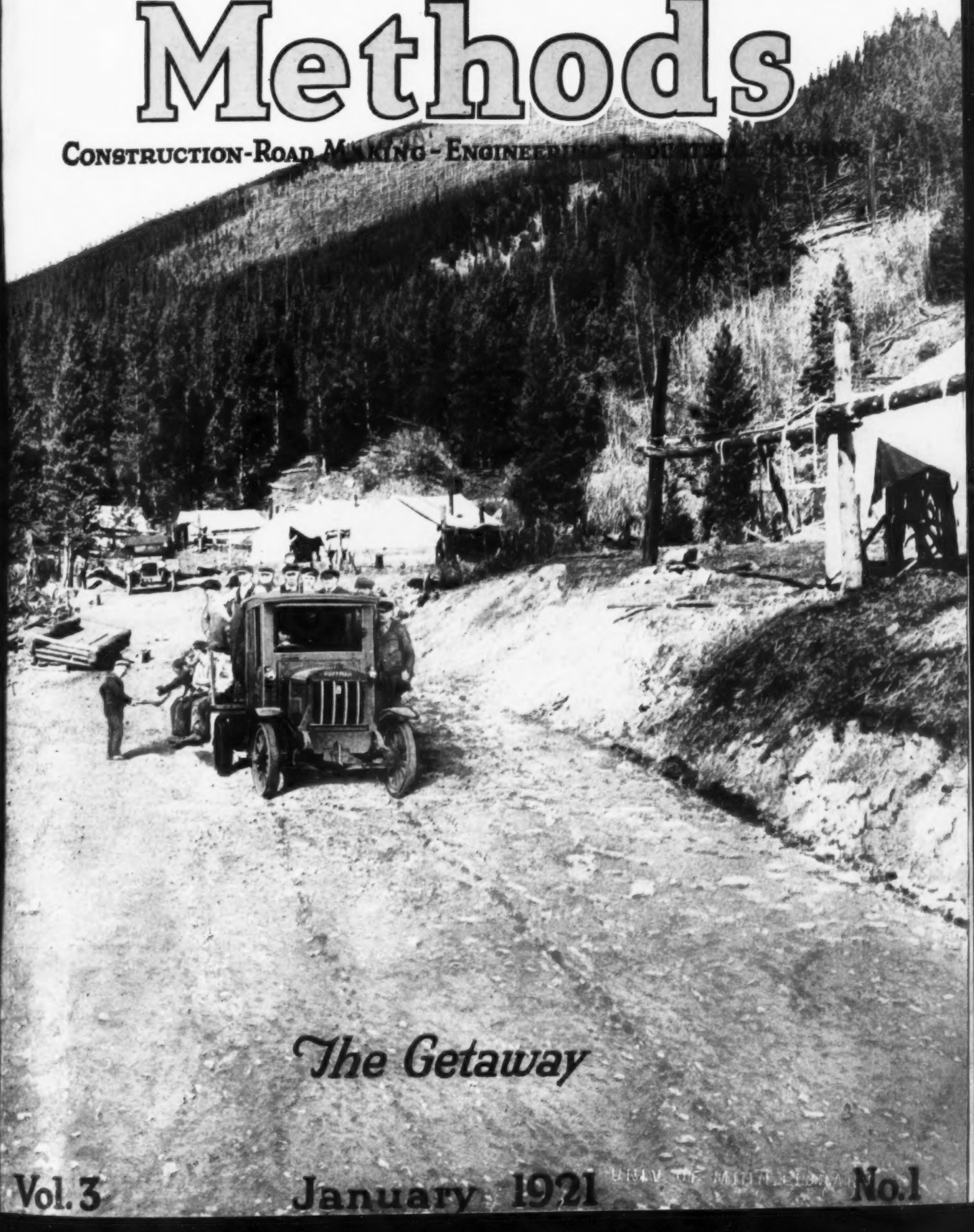
Successful Methods

CONSTRUCTION-ROAD MAKING-ENGINEERING



The Getaway

Vol. 3 January 1921 No. 1

THE export business of the non-competing manufacturers whose advertising appears in this Magazine is handled by the Allied Machinery Company of America.

ALMACOA

To Increase the Power of Human Hands

TO HARNESS the water power—to build highways and railways — to construct harbors — to erect buildings — to afford irrigation and drainage — to make this old world of ours a better place in which to live is a gigantic task.

Human hands — unaided — would take an eternity to produce results,—but human hands plus the economical and efficient work of labor conserving machines make the task possible and practical.

This is the function of the Allied Machinery Company of America, and it is organized to fill it. Almacoa machines to increase the power of human hands and Almacoa men to show how to do it.

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Successful Methods

A Magazine of Construction Service

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140 South Dearborn Street, Chicago.

Vol. III | January, 1921 | No. 1

THE GETAWAY

The sprinter crouched on his mark is the supreme example of the value of a quick getaway. Until a comparatively few years ago sprinters started from an upright position. Then one intelligent athlete discovered that by crouching like an animal preparing to spring, he could gain an advantage over his rivals that would carry him to victory.

It is the same in the construction race. The getaway is all important. The laggard who fails to figure on contracts until the last moment, who lets slip his opportunity to get his materials on the ground during the off months, who neglects to order his machinery and equipment until too late for the manufacturers to fill his order in time, is bartering his birthright for a few days of costly laziness.

The New Year is here. Remember that the demand for new and better roads and the need for new buildings of every kind has not yet been met. But in order that the contractor may find 1921 a profitable year, a quick getaway is essential.

Plan now. Store material now. Order equipment now. Now is the time for a "Quick Getaway."

This Magazine Will Be Sent to Men Who Can Use It

EDITORIALS

Ship Now

ONE of the factors which played havoc with the nation's construction program for 1920 was the car shortage. Probably it was the biggest joy-killer of the entire lot. Many a road would have been finished and many a big building put up if only cars could have been found in which to ship the necessary materials.

Within the last few weeks the first surplus in cars for several years has come into being. Under pre-war conditions there always was such a surplus beginning at about this time and lasting for several months. But don't be fooled by that for this surplus isn't likely to last. In the opinion of one of the best versed men in the railroad business, the demand for cars will outstrip the supply by May 1 at the latest.

So "Ship Now." Take advantage of the cars that are now available, and don't fool yourself into believing that the car shortage is a thing of the past.

If you are building roads your situation is particularly fortunate, for as was shown in the December issue of SUCCESSFUL METHODS, many of the state highway departments are paying for material when delivered on the site of the work.

Don't let an opportunity like this slip. Ship now.

Construction in 1921

THE construction field is not suffering from any lack of attention to its ills. Everyone seems to be keenly alive to the fact that the welfare of the country as a whole depends upon the construction of houses to live in, roads to travel on, and buildings in which to carry on the manifold processes of industry.

The Calder Committee of the United States Senate is making an exhaustive investigation of construction problems. Its preliminary report shows that these problems are being considered in their broadest aspects.

All this attention helps. The construction field as a whole cannot fail to benefit. And the results will begin to show soon.

Putting a Machine in a Cage

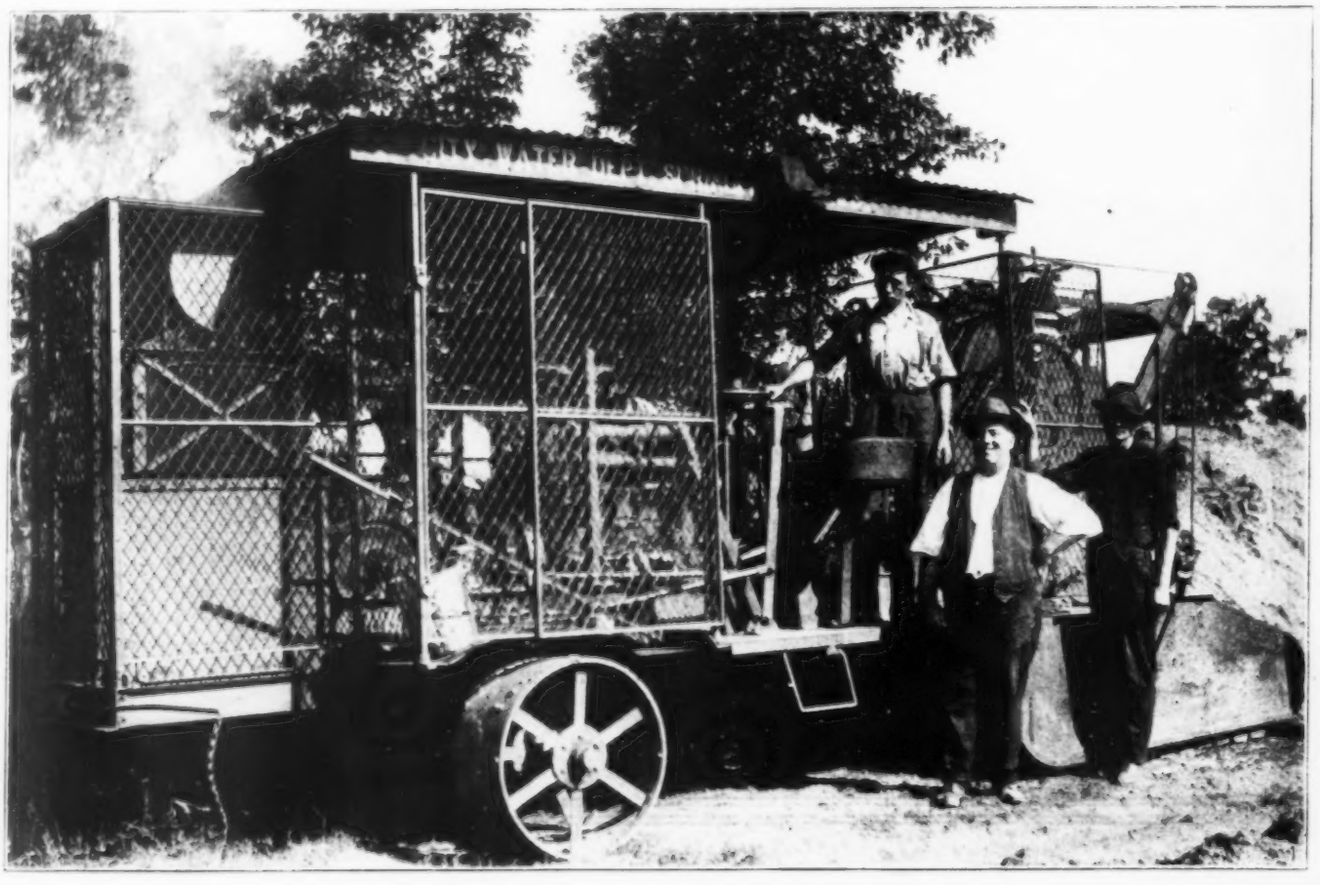
CAGES usually are built for the purpose of keeping something in. The one pictured on this page is used to keep people out.

And chief among the "people" who have to be kept out is the small boy. Much as the mechanical instinct rampant in the youth of the land is to be admired, it isn't always an unmixed blessing. The owners of this excavator didn't find it so and the cage is the result.

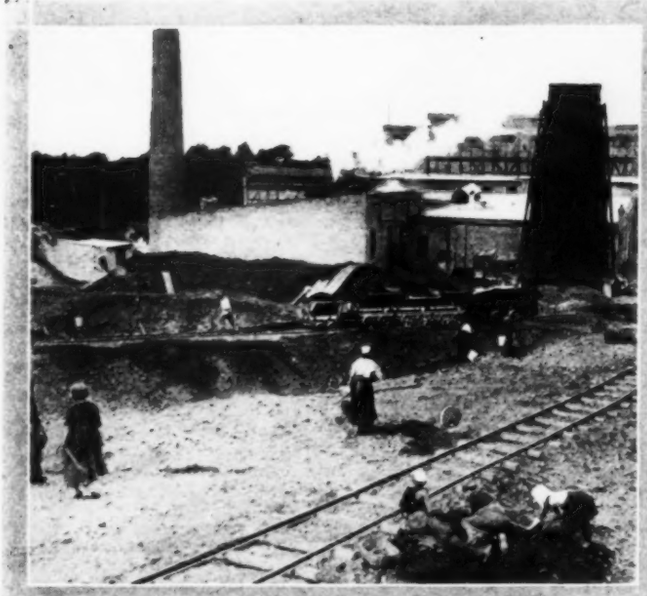
One interesting phase of the problem is this. When a machine is left in the poorer part of a city, the boys let it alone, but when it is in the section where wealth and culture are supposed to abide, the boys all but carry it away bodily.

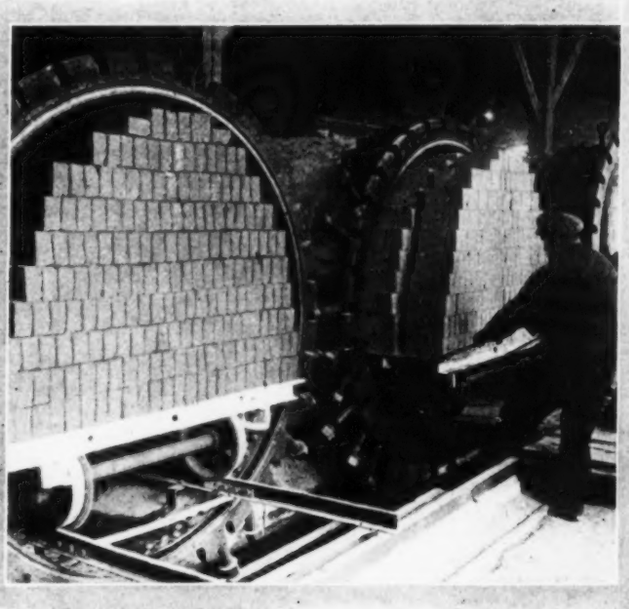
What's the answer? Let the sociologists work it out. SUCCESSFUL METHODS has neither the time nor the inclination.

A well protected excavator in Springfield, Mass.



MAKING BRICKS FROM WASTE IN GERMANY





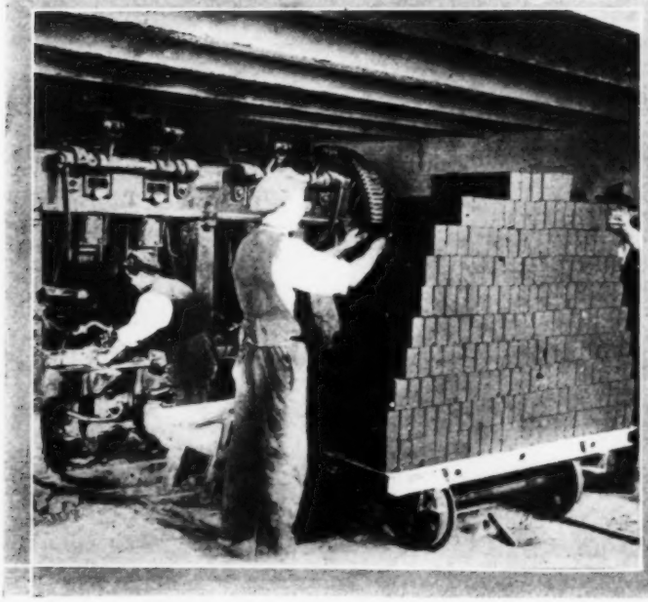
Above — Women collecting cinders and other waste near gas houses and railroads.

In the Center—A finished house built at moderate cost.

Below—One of the pressing machines at work.

Above — These big cylinders are used for drying and hardening the bricks.

Below—Outdoor drying and curing in wooden forms. The factory at which these photographs were taken turns out about 37,000 bricks a day.

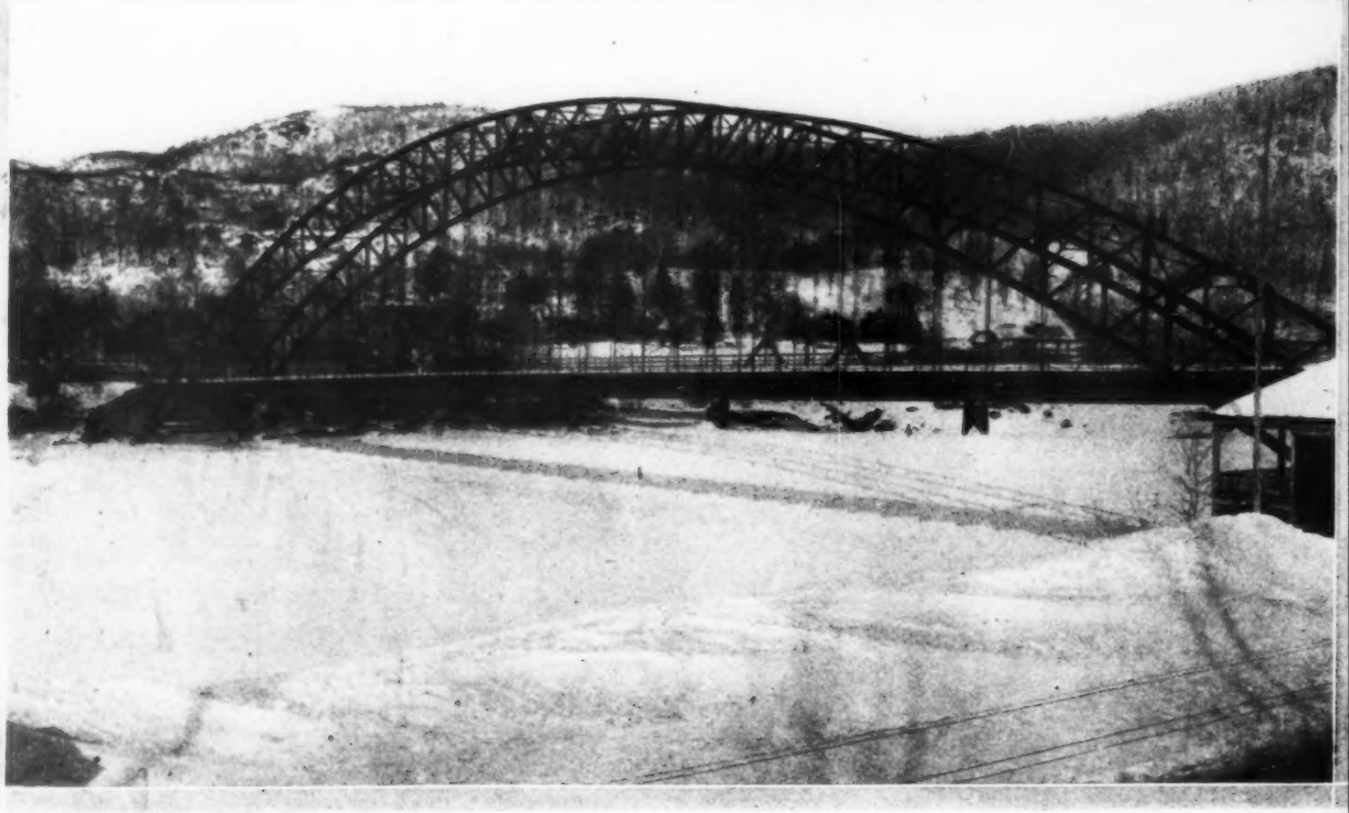


OLD AND NEW WAYS

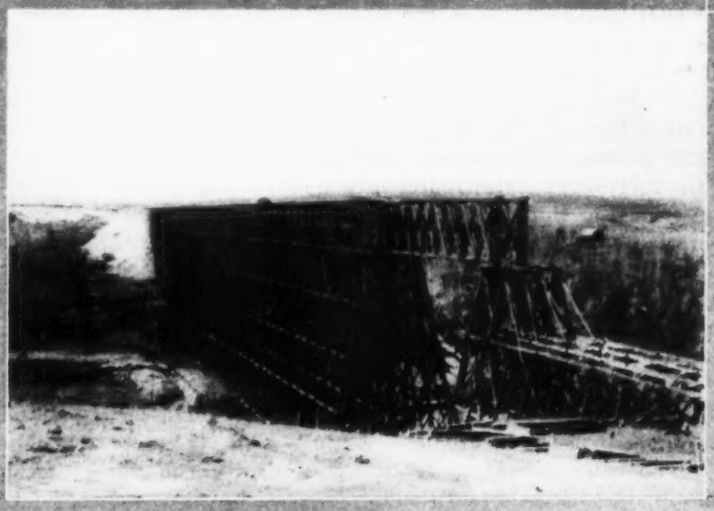
Above—A big structure in the Antipodes. The Hawksbury bridge near Sydney, N. S. W.

At the Right—An illustration of the way the Japanese get across a river.

Below—An interstate bridge in New England. It crosses the Connecticut River between Bellows Falls, Vt., and Walpole, N. H.

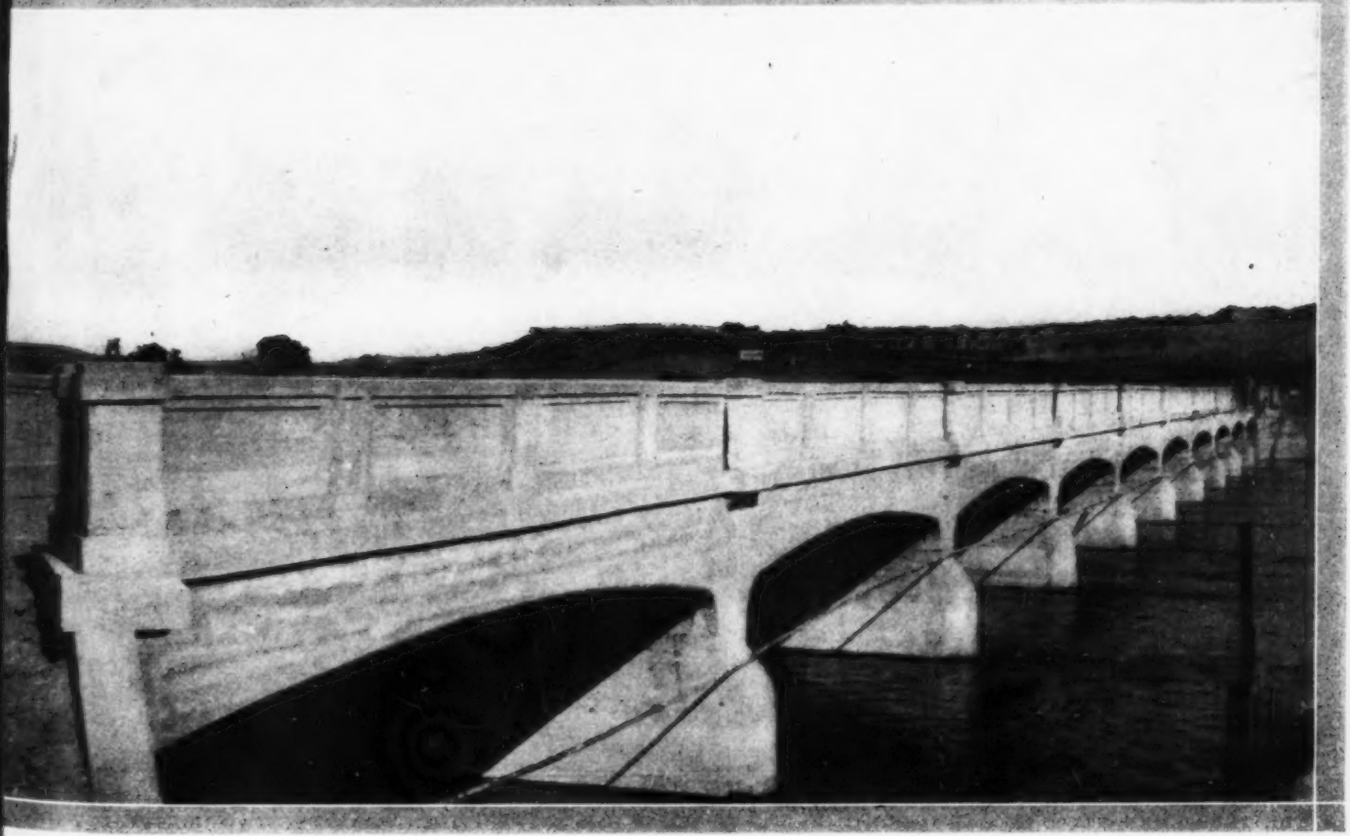


OF BUILDING BRIDGES



Above—A big wooden bridge that has had its day. It is in Alberta, Canada, and is being torn down.

At the Left—A link in the road to the oil fields near Casper, Wyoming. This concrete bridge, built last summer by the State Highway Department, crosses the Platte river.



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HIGHWAY OFFICIALS MEET IN WASHINGTON

Nearly All the States Are Represented In Annual Convention

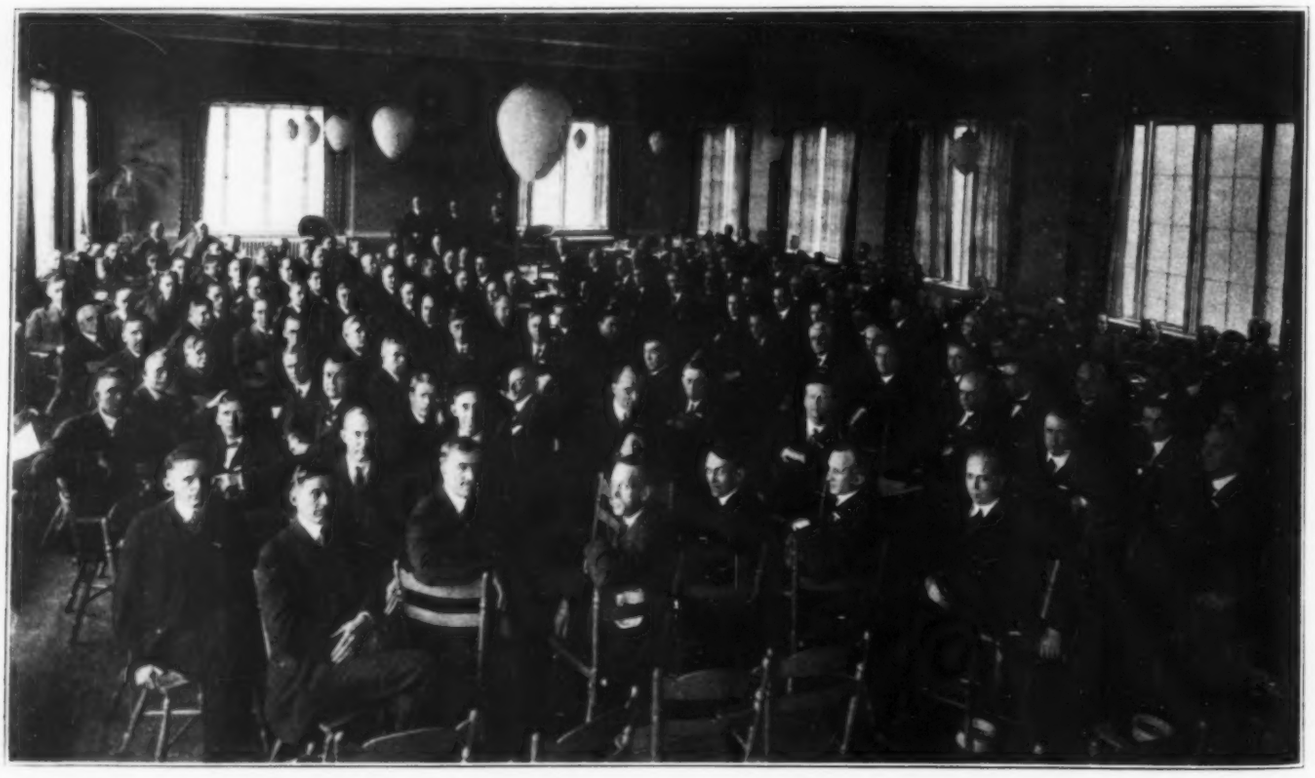
COOPERATION with the Federal Government, with each other, and with the contractors to whom is entrusted the actual work of road building, was a keynote of the annual meeting of the American Association of State Highway Officials held in Washington, D. C., in the middle of December. With all but two or three of the forty-eight states represented and a strong delegation from the Bureau of Public Roads on hand, the cooperative spirit had plenty of opportunity to flourish. Some states like West Virginia sent all of their district engineers to the convention. Many states were represented by the State Highway Engineer and one or more of the members of the highway commission. And with so many men present, whose business it is to direct the building of highways, the sessions proved full of interest and value to those in attendance.

The convention lasted four days giving plenty of time for the discussion of a wide variety of topics as well as for a visit to the experimental farm at Arlington where the Bureau of Public Roads is conducting tests which undoubtedly will be of great value in the development of road building.

With Paul D. Sargent, State Highway Engineer of Maine and President of the Association, in the chair, the first session was opened with an address of welcome by E. T. Meredith, Secretary of Agriculture, who stated that in his annual report he had recommended additional Federal Aid appropriations at the rate of $100,000,000 beginning July 1, 1921, and covering a period of five years. The advancement of Federal Aid legislation now pending in Congress was made one of the chief objectives of the convention and numerous conferences were held with members of Congress culminating in a hearing before the House Committee which has charge of road legislation in which the Association was represented by one or more men from every state in attendance. The speedy passage of the Chamberlain bill in the Senate and the McArthur bill in the House was urged by five speakers from the Association, George P. Coleman, State Highway Commissioner of Virginia; S. E. Bradt, Superintendent of Highways of Illinois; Rollen J. Windrow, State Highway Engineer of Texas; L. A. Gillett, State Highway Engineer of New Mexico; Lewis S. Sadler, State Highway Commissioner of Pennsylvania, and Thomas H. MacDonald, Chief of the Bureau of Public Roads. These men, each representing a section of the country, made strong arguments for a passage of the Chamberlain and McArthur bills.

Few of the state engineers present were specially proud of their performance during 1920. In his opening address Mr. Sargent said that he doubted if more than 25 per cent of the projected program of highway construction had been carried out during the year. This, of course, was in no way due to any failure on the part of the State Highway Departments. The shortage of labor and the impossibility of obtaining a sufficient number of open top cars to transport material were the chief causes of the curtailment of the big program mapped out for 1920.

The shortcomings of the season just ended were



THE FIRST SESSION OF THE CONVENTION, WITH DELEGATES FROM ALL BUT TWO OR THREE STATES IN ATTENDANCE. THE THREE MEN STANDING ARE (LEFT TO RIGHT): PAUL D. SARGENT, PRESIDENT, AND THE TWO GUESTS OF THE CONVENTION, F. C. BIGGS, MINISTER OF PUBLIC WORKS OF ONTARIO, AND W. A. McLEAN, DEPUTY MINISTER OF HIGHWAYS OF ONTARIO. (Copyright, Underwood & Underwood.)

made the subject of several of the papers read, the attempt being made to profit by experience. The discussion of the railroad situation, for example, filled a large part of the Wednesday morning session, several of the state engineers first telling of the troubles of 1920 and a representative of the railroads replying and prophesying better service for 1921. It was brought out by this discussion that there is now for the first time in several years a surplus of open top cars, that the coal situation which played havoc with the road building plans last season is greatly improved and that there are indications that during the coming season embargoes, special permits, etc., will not be so vexatiously conspicuous as they were last summer and fall.

THE EXPERIMENTAL FARM AT ARLINGTON. AT THE LEFT IS A. R. HIRST, STATE HIGHWAY ENGINEER OF WISCONSIN. IN THE FOREGROUND IS A. N. JOHNSON, CONSULTING ENGINEER OF THE MARYLAND ROADS COMMISSION.

The growing emphasis on research work was another notable feature of the convention. Many of the states are now conducting experiments of various kinds and the work of the Bureau of Public Roads is proving more and more valuable every day. During the convention the men from the different states in direct charge of this research work got together and discussed their problems.

At one of the sessions H. F. Clemmer, testing engineer of the Illinois State Highway Department, exhibited and described some of the instruments which are in use at Springfield in making various tests of subgrade and on Tuesday afternoon all of the delegates to the convention spent a number of hours at Arlington where A. T. Goldbeck, Testing Engineer of the Bureau of Public Roads, described the work he is doing and conducted several tests in the presence of the visitors.

That the engineers are both ready and willing to cooperate with the contractors who do the actual road building was a fact that kept cropping up throughout the session. The discussion of the new form of highway contract devised by W. R. Neel, State Highway Engineer of Georgia, and used on several contracts during 1920 brought out many expressions of approval for any plan which would lessen the burden of the contractor. As Frederick R. Greene, State Highway Commissioner of New York, said during his discussion of Mr. Neel's paper, "All ties should be decided in favor of the contractor."

The encouragement of contractors who are new to the highway field was referred to several times and it seemed to be the consensus of opinion that everything possible should be done to encourage the newcomer.

Numerous conferences of the engineers from various sections were held during the convention. The chemists got together one evening; the men actually in charge of construction jobs had dinner together; and the many problems arising between the state departments and the Bureau of Public Roads were thrashed out during the four days.

As Thomas H. McDonald, Chief of the Bureau of Public Roads probably is in closer touch with the road-building situation all over the country than any other man, part of the paper which he read at the opening session of the convention is reprinted herewith:

"The extent of the development of the State and Federal highway organizations is well shown by contrasting the engineering output as indicated by the project agreements executed between the fiscal years 1917 and 1920. In 1917 six project agreements were executed, in 1920, 1286, more than 200 times as many. Project agreements in 1917 called for a total expenditure of $547,092, of which $224,717 was Federal Aid. In 1920 the total estimated cost of projects was nearly $200,000,000, of which $86,000,000 was Federal Aid, an increase of nearly 400 times the amount requested in 1917.

"The construction record also is good. Prior to the fiscal year 1920 only 59 projects, comprising 293 miles and involving Federal Aid in the amount of $1,284,806 had been completed.

"The fiscal year 1920 added to the list of completed projects 233 more, or nearly 4 times as many as had been completed up to the beginning of the year. These 233 projects involved 1384 miles and $7,635,547 of Federal Aid, so that the record of entirely completed projects at the end of the year was as follows:

Number of projects completed	292
Mileage of completed projects	1,677
Federal Aid allotted to complete projects	$ 8,920,353
Estimated total cost of completed projects	20,878,484

"The above refers only to entirely completed projects. In addition to these there were at the end of the fiscal year (June 30, 1920) 1835 more projects under construction, involving 14,940 miles, and Federal Aid to the amount of $103,925,094, the estimated total cost of these projects being $241,977,217.

"As these projects were reported at the end of the year as being 30 per cent complete in the aggregate, it follows that the work done on these uncompleted projects up to the end of the year would call for approximately 30 per cent of the Federal Aid allotted to them, or $31,174,732. This, added to the Federal Aid expended on completed projects ($8,920,353) gives a total equivalent expenditure of Federal Aid up to the end of the fiscal year of $40,095,085. At the end of the fiscal year 1919, the amount allotted for completed work was only $4,658,749, so that the Federal Aid allotted to work completed during the year was $35,436,336.

"But until the first of July, 1920, we had not yet caught our stride in construction work. In the face of the most serious shortage of rail transportation, between June 30 and October 31, 329 additional projects were completed, or 37 more than had been completed in the four years preceding, making the total completed projects on October 31, 621.

"The Federal Aid and mileage, of course, were correspondingly increased, and in order to show the amount of the increase the several items are listed below for the two dates.

	June 30, 1920	October 31, 1910
Number of projects completed	292	621
Mileage of completed projects	1677	3191
Federal Aid allotted to completed projects	$8,920,353	$20,900,014
Estimated total cost of completed projects	20,878,484	46,740,472

"Notwithstanding the great increase in these items for completed projects, the corresponding items for the projects under construction on October 31 were not decreased, but largely increased. On that date there were 17,369 miles under construction, to which had been allotted $121,322,198 of Federal Aid. These projects were reported as 43 per cent complete in the aggregate; hence the equivalent Federal Aid expenditure upon them was $51,844,586. This amount added to Federal Aid expended on completed projects gives a total of $72,744,600 as the equivalent of the Federal Aid expended for completed work up to October 31.

"Thus the work completed on October 31, 1920, has consumed, practically speaking, the whole amount of Federal Aid appropriated up to February 28, 1919.

"It will be noted that during the previous four-months period construction was completed requiring approximately $32,000,000 from Federal Aid funds, or $8,000,000 per month. The acceleration of the rate of construction will be large when highway building is operating under more favorable circumstances. It is now apparent, however, that conditions will vary widely between the States. As closely as can be approximated at this time it appears that if freed from influences which have so hindered construction during the past season, particularly the lack of rail transportation, the rate of expenditure will be greatly increased, and by the end of the calendar year 1921 eight States will have expended the full amount of their Federal Aid apportionments, twenty more States will have expended or placed under contract all of their funds, five will have placed their funds under contract by the middle of the following year, fifteen will have placed all of their work under contract by the end of the year 1922. The number of States in each of the above classes may vary somewhat, but the figures here given are based on the best evidence obtainable."

DIGGING A HOLE IN LONDON'S HEART

American Steam Shovels Attract Attention in Excavating for Bush Building

AMERICAN machines digging the excavation for the foundations of a building which will embody American ideas in the very heart of London are shown in the photograph on this page. The two steam shovels shown are at work in the excavation for the Bush Building on the Aldwych Island site at the junction of Kingsway and the Strand. A pair of steam shovels working together in one excavation is decidedly unusual in London and this is said to be the first time that such a thing has been seen.

American contractors will be interested in the small carts which are used for carrying away the excavated material. They seem tiny and frail when compared with the motor trucks and wagons which are now used for that purpose over here. The explanation is that some of the streets through which the carts must pass on the way to the points where the material is discharged are so narrow that there is no room for larger wagons or motor trucks.

The Bush Building in London is being put up by the same interests which control the Bush Building on 42nd Street in New York City. It will be used as a central exhibition hall and sales office for manufacturers. John Mowlem & Co., one of the leading London contractors, is doing the work.

AN ARDENT GOOD ROADS ADVOCATE

IF, as has been said, "the development of a state is as fast, but no faster, than the development of its highways," then Montana is particularly fortunate in having as her Lieutenant-Governor-elect a man who has devoted, and is still devoting, the best years of his life to the solution of this fundamental problem.

In years "Bud" Story is young. In experience as a road builder, he is both a sage and an expert. It was less than 45 years ago that this typical western son of a westerner first saw the light of day in the far-famed Gallatin Valley, but the last 30 years of this span of time have been largely given to studying and improving road-making and road-improving methods.

NELSON STORY

These efforts have been given both in a personal and public capacity. Personally, good roads form his chief hobby. And in the various public positions he has filled, he has officially been at the front in the movement. He became mayor of his native city of Bozeman when little more than a youth and the sentiment which later resulted in Bozeman's splendid streets was crystallized under Story's administration. As a member of the Montana Legislative Assembly, he raised his voice and cast his vote for every measure having for its aim the improvement of Montana's highways. As County Commissioner of Gallatin County, he put into practice some of the theories and plans he had long advocated. In that position, he purchased and operated the first crawling traction steam shovel used in the State; rather it should be said, the Gallatin County board adopted this equipment through the advocacy of Mr. Story. That system, started in Gallatin, has been extended throughout the state, which is its strongest recommendation.

Thus "Bud" Story is the pioneer in road construction work in Montana with heavy excavating machinery. His ideas, advocated many years ago, were in advance of that time, but they are now generally put into practice.

He is a champion for those construction policies which contemplate: *A. Adequate drainage of roads: B. Building the most direct way between fixed points: C. Establishing a permanent base for permanent highways that can be used as semi-permanent highways until such time as permanent surface can be laid.*

With his enthusiasm, sound ideas and long experience in highway construction and maintenance, it is not small wonder that "Bud" Story is president of the Federal Highway Council's Montana organization.

To know him is to like and admire him. In his family life—he has a wife and two children—he is a model husband and father. As a man and citizen, he is progressive in his views and in character he is above reproach.

"Bud" Story was not swept into office as a part of the great wave propelled by Republican victory. Rather was he elected because of his sterling worth and wide personal popularity. Everybody who knows him, knows that he is as much at ease in his rough hat and corduroy trousers, mixing with the crew of road workers, as he will be presiding over the state senate as Montana's Lieutenant-Governor.

And not the least of reasons for his wide popularity and the esteem in which he is held is the fact that he has traversed every road in the State and enjoys the acquaintance of men, women and children along every one of Montana's highways. That also is one of the reasons he is now Lieutenant-Governor.

Help to Continue Federal Aid in Roadbuilding

ALL of the readers of SUCCESSFUL METHODS who are interested in road building can help to advance the interests of that work by using whatever influence they may have with their Congressmen or Senators to urge the passage of the Chamberlain Bill in the Senate and the McArthur Bill in the House. These bills which are pending in the present session of Congress provide for further Federal aid appropriations at the rate of $100,000,000 a year for four years. The last appropriations under the existing Federal Aid act will be allotted in July, 1921, and if the great work of co-operation in road building between the Federal government and the states is to be carried on, further appropriations will be necessary. In the next few months forty state legislatures will meet, thirty of them in states which provide for biennial sessions of their legislatures and if these states are to plan ahead and make appropriations for future road building with the assistance of Federal aid funds, the amount of such funds available must be known as soon as possible.

If you want to see road building continued on the present scale write to your Congressman or Senator and ask him to vote for these bills.

A "BIG CHIEF" IN THE BUILDING LINE

Edward A. Hurley, Works Manager for the Foundation Company, Makes Remarkable Record on $25,000,000 Construction Job

ON the outskirts of Buffalo, N. Y., the Foundation Company of America is finishing a $25,000,000 construction job for the Dunlop Tire & Rubber Corporation of America on a tract of land consisting of 215 acres in area which only nine months ago was a waste of unimproved land and which is now covered with factory buildings where pneumatic and solid tires will be turned out by the Dunlop Tire & Rubber Corporation.

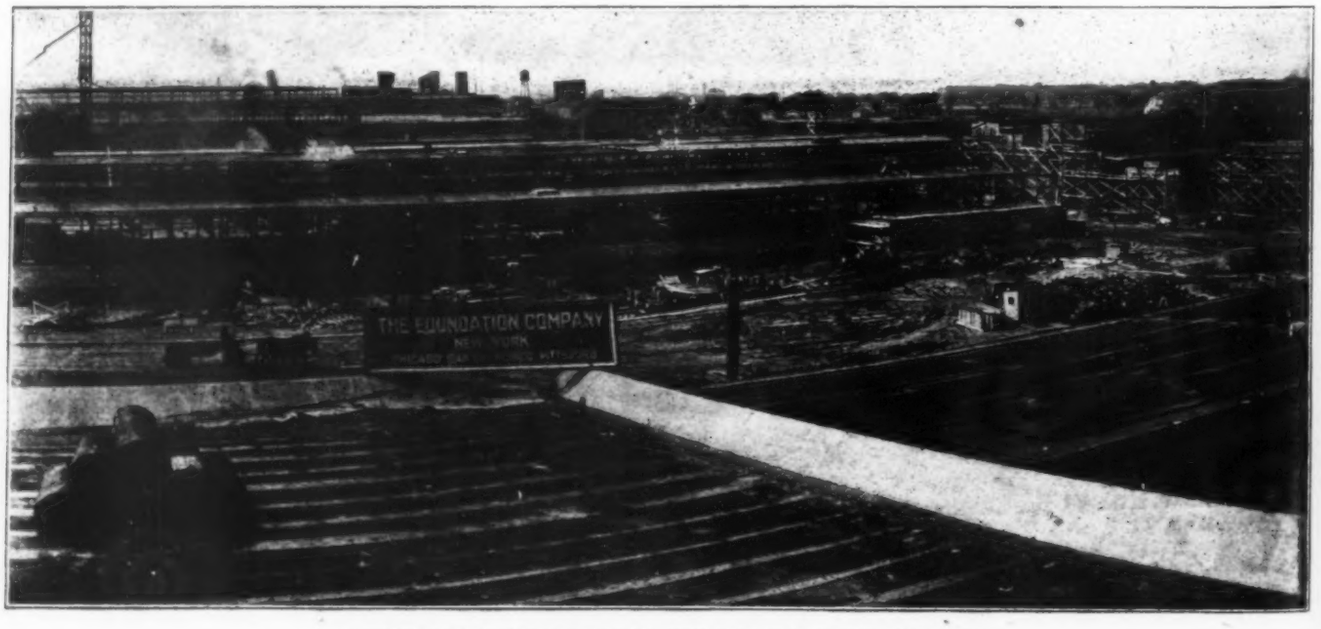
The biggest building of the lot is a 4-story reinforced concrete warehouse, 546 ft. long by 166 ft. wide. In addition to this, there are ten brick and steel buildings, 560 ft. long for manufacturing purposes and a boiler plant.

It is hardly necessary to say that remarkable speed has been one of the features of this job, and the man responsible for this speed is Edward A. Hurley, works manager for the Foundation Company and known to all the men on the job as the "Big Chief."

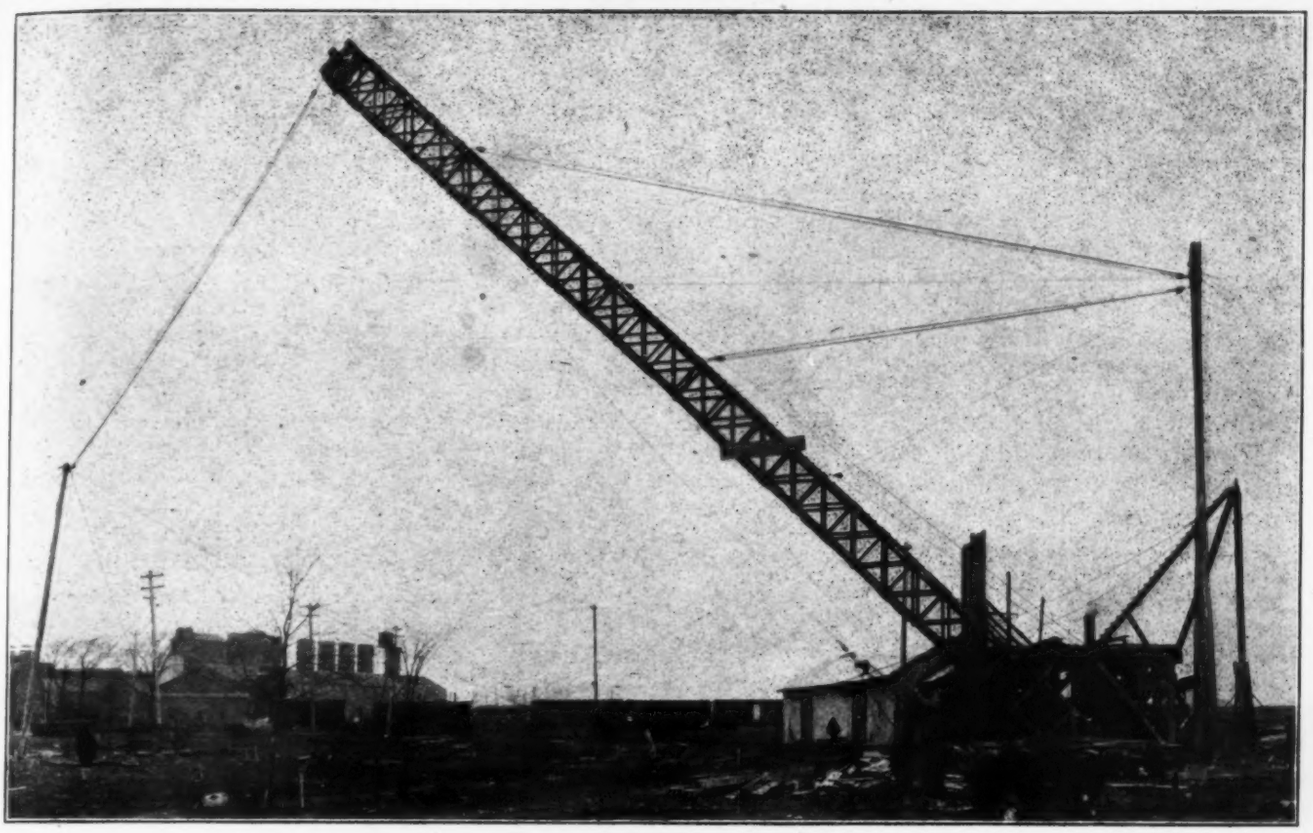
MR. HURLEY ON THE JOB

Mr. Hurley is a Kentucky Irishman, born in Louisville. He went to college in New England and learned civil engineering, but before that, had held various jobs in the construction business, beginning with the job of water boy. After getting out of college he went to Boston, where he engaged in sewer work. He continued in this branch of engineering for several years and during that time laid sewers in East St. Louis, Cleveland and Detroit. Then the building of the New York subway engaged his attention and finally he went with the Foundation Company, starting out in mining development work. Later he became assistant district manager and then works manager. Among the big jobs he has done for the Foundation Company in the last mentioned job is the Richmond Powder Loading Plant, a $10,000,000 job.

The Buffalo job is such a big one that the "Big Chief" finds it impossible to get around on foot and cover the whole work. The going in automobiles is a bit bad so he has acquired a horse and makes the rounds in true



A PANORAMIC VIEW OF BIG DUNLOP JOB NEAR BUFFALO



RAISING ONE OF THE CONCRETE CHUTING TOWERS IN THE EARLY STAGES OF THE WORK

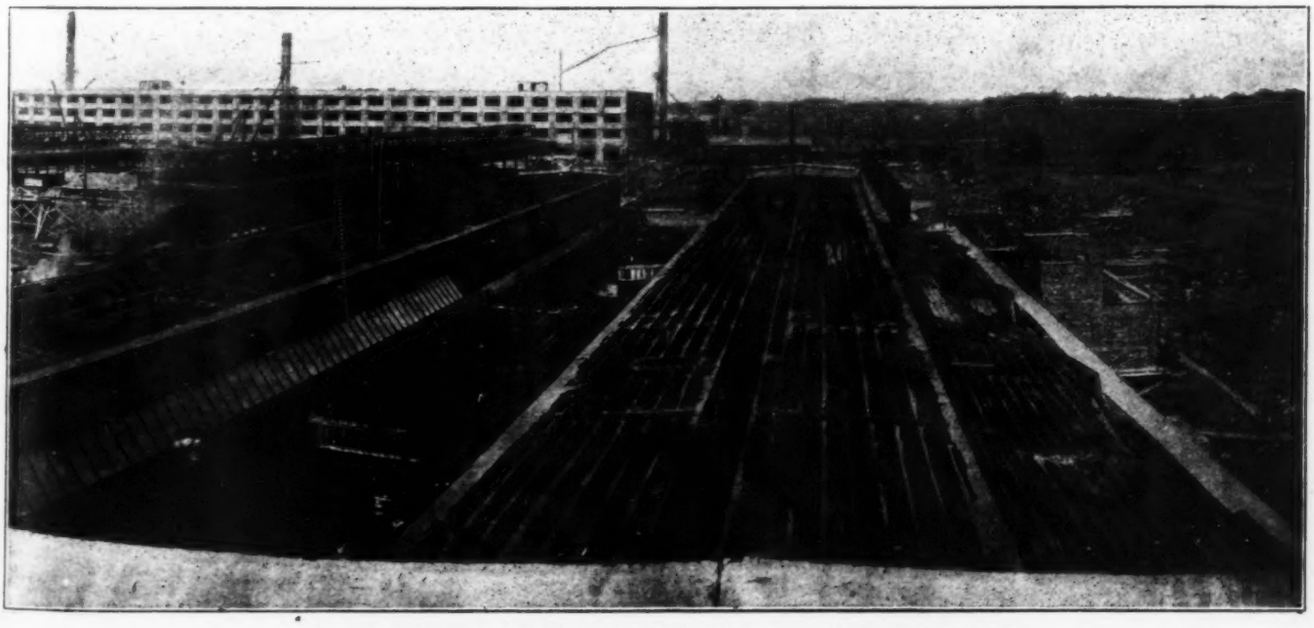
cowboy fashion. He alighted from his horse long enough to tell the representative of SUCCESSFUL METHODS a few facts about the work on the new warehouse where some of the best speed was made.

This building was completed in 40 days, 22,000 yd. of concrete being poured in that time, the floor slabs being 8 in. thick. Two mixing plants and distributing towers were used on this building, the aggregates being hauled to the mixers on industrial track. The longest haul necessary was 2,500 ft. The gravel used was obtained from the Niagara River.

One reason why Mr. Hurley was able to complete the job in such a short time was the way he arranged his shifts. The reinforcing was done at night and the concrete was poured during the day. The carpenters worked all day, but the finishers worked in two shifts, one going on at noon and working 8 hours and the other shift starting at 8 p. m.

This system kept things moving with a smoothness and speed that could not otherwise have been maintained.

Aside from all the other proofs of speed on the construction of this plant, the Dunlop Tire & Rubber Corporation produced and manufactured the first tires on August 26, 1920.



THE WAREHOUSE APPEARS IN THIS HALF OF THE PHOTOGRAPH

A TRIO OF TRENCHERS

All Three of Them Are Making Good in Massachusetts

THREE Massachusetts municipalities, the cities of Springfield and Brockton and the town of Greenfield, purchased trench excavators last spring and have been using them through the summer and fall. In Springfield and Greenfield the machines were used by the Water Departments, and the excavator in Brockton is the property of the Sewer Department. All three machines were kept busy most of the time and effected a great saving in hand labor at a time when hand labor was extremely hard to get.

Two of the photographs which illustrate this article show the machine owned by the city of Springfield. One of them shows the excavator at work on a rather unusual job on St. James Boulevard. A 30-in. pipe which was laid some years ago as part of an old supply line had to be lowered from 1 to 1½ ft. for a distance of about 700 ft. due to a change in the grade of the street since the pipe was laid. The excavator dug a trench 2 ft. wide on one side of the pipe and at the same time 6 men with shovels worked on the other side of the pipe throwing the dirt over into the buckets. Owing to the fact that it was a small job which lasted only a day and a half, the belt on the conveying mechanism was not extended to its full length and 7 men were necessary to help pull the excavated dirt back from the side of the trench. These men would have been unnecessary if the job had been big enough to justify a readjustment of the belt. As may be seen in the picture, a support of earth was left under the pipe at intervals of a few feet and the pipe was sunk by loosening the supports with shovels. As soon as they were loosened, the weight of water-filled pipe gradually sank it the required depth.

LOWERING A 30-INCH PIPE WITH THE AID OF AN EXCAVATOR AT SPRINGFIELD, MASS.

After the job was completed the back filler, operated by one man with two men to clean up with their shovels, filled the trench in one day.

H. M. King, Assistant Superintendent of the Springfield Water Department, said that to do the entire job by hand labor in the same length of time would have required from 40 to 50 men.

The excavator which reached Springfield last May has been busy ever since laying pipe in various parts of the city. It first laid a mile of 16-in. pipe. Later it took out ½ mile of 16-in. pipe and then laid 2 miles of 8-in. pipe. Mr. King estimated that before cold weather prevented further work it would dig 2 or 3 additional miles of trench. The gang working with the excavator consists of about 8 to 12 men. Their main job is to roll the pipe and get it into the trench. Before the excavator was bought, the gang to do similar work consisted of about 35 men.

The other picture of the Springfield machine on page 2 is printed to show the ingenious wire gates with which the machine is equipped in order to protect it at night from depredations of small boys and thieves. This arrangement of wire netting was planned by Mr. King, and was built at the cost of about $300. It saves the expense of a watchman who would be paid about $150 per month. In addition to the netting the machine is equipped with canvas curtains, which protect it against the weather.

The excavator bought by the town of Greenfield arrived in the latter part of June and has been hard at work most of the time since. Its first job was in clay so soft that the truck almost sank into it, but the machine operated so efficiently that it was possible to lay the pipe immediately after a heavy rain. Later on it dug a trench for 200 ft. of pipe through extremely hard clay and accomplished the work in three hours. On straightaway work it has averaged around 400 ft. a day.

Because of the ease with which it can be moved around, George F. Merrill, Engineer and Superintendent of the Water District, used the excavator for laying service pipes in one section of the city. There was a group of 8 or 10 new houses close together, and the machine after laying the main pipe dug trenches about 60 ft. in length into the houses. Altogether it dug trenches for about 500 ft. of 1-in. pipe, and the Water District was able to do the job at a price of $10 per service with $2 for backfilling. Hand labor for similar jobs costs about $20. Mr. Merrill said, however, that this sort of work did not pay unless there were a number of houses close together to which service pipes had to be laid, but that in any new home colony it undoubtedly would effect considerable saving.

The photograph at the top of the next page shows the character of the soil in which the excavator bought by the city of Brockton has been working. Stones and boulders, some of them of considerable size, are encount-

HEAVY GOING IN BROCKTON, MASS., SOME OF THE BOULDERS ENCOUNTERED MAY BE SEEN ALONG THE SIDES OF THE TRENCH

ered frequently by the machine, but it has taken care of all of the small ones, and in some cases has taken out boulders of greater size than was expected of it. Harold S. Crocker, Engineer, says that the machine has effected a saving of from 50 to 75 ct. per cu. yd. in the work it has done thus far, and he expects that the reduction will be found to be even greater when the cost figures are tabulated during th winter months.

On the job shown in the photograph the machine excavated about 1,000 ft. of trench 7½ ft. deep by 36 in. wide in 10 working days, and as said before, the character of the soil made the work extremely difficult.

A gang of 3 men plus the operator work with the machine. On one occasion where the digging was easier it excavated 175 ft. of trench 7 ft. deep in 3½ hours.

All three municipalities have work enough ahead to keep their excavators busy for some time to come, and the officials in charge of the work in all three places are enthusiastic over the savings effected.

Illinois Keeps Pace With Times

A RECENT issue of the *Highway Bulletin* issued by the Division of Highways of the State of Illinois, gives an interesting resume of the evolution in highway specifications in that state. It shows how the demand for wider and thicker pavements has increased year after year. The experience of Illinois is typical of what has been going on all over the country. The *Bulletin* says:

"The evolution in highway specifications is, in view of the present traffic situation, an interesting study. In 1913 our plans called for a concrete road 6 inches thick laid on a crowned subgrade. Beginning with 1915 we built a flat subgrade making the pavement 7 inches thick in the center and 6 inches on the side. Conditions brought about by the war forced a heavy truck traffic, especially in the east, and demonstrated the fact that our roads would be called upon to carry a much heavier burden than anticipated. Accordingly, our Federal Aid plans for 1919 called for pavements 7 inches in thickness at the side and 8 inches in the center. We realized later that on our double track pavements traffic was practically as great on the side of the road as in the center. We therefore decided upon another change and are now building all concrete pavements 8 inches thick throughout their entire width—or where other types are used—what we consider to be the equivalent of an 8-inch concrete pavement.

"The evolution in widths has been much the same. In the beginning of state road construction, a 10-foot road was considered sufficient on all roads except those adjacent to large centers of population, like Chicago. Now we are building all roads on the Federal Aid System, 16 and 18 feet wide. In the future 18 feet will undoubtedly prevail—all of this because of the greatly increased traffic, as evidenced by the greatly increased registration of motor cars and trucks.

BRIDGE BUILDING IN GEORGIA

Curved Approach Necessary in Structure Over Flint River

By W. R. Neel, State Highway Engineer

MOST engineers profit by their own experiences gained during the process of constructing buildings, bridges and highways, but in describing the features of construction in any of these fields they fail to give others the benefit of the knowledge they have acquired. If they would describe the problems which they have encountered during actual construction and then state what methods were employed to solve them, a great amount of time and expense would be saved for those who face the same difficulties in construction work.

In giving an account of the construction of the Flint River bridge it has been my idea not only to describe the manner in which the work was carried on, but also to point out the important conclusions which were reached by the engineers as a result of their experiences in building this bridge.

History

Between Montezuma and Oglethorpe, the Dixie Overland and Dixie Highways cross the Flint River. The river crossing at this point was effected by a light steel structure with long wooden approaches. Freshets occurred three or four times a year which entirely covered portions of the wooden approaches and the roadway leading to the bridge. In order to relieve this situation, the State Highway Commission in 1917 decided to construct this bridge, putting it entirely above high water. The co-operation of Macon County was procured and designs were prepared for the bridge by Searcy B. Slack of the firm of Garrett & Slack, Montgomery, Alabama.

An effort was made to let the contract for this work in September, 1918, but owing to war conditions, no bids were received at this time. As soon as the armistice was signed the work was advertised and the contract was awarded in March, 1919, to the Nichols Contracting Company of Atlanta for the concrete approaches and to the Austin Brothers Bridge Company, Atlanta, for the steel river spans and concrete piers.

Location

Funds for the bridge were limited. The structure was located in such a way that traffic could be maintained over the old bridge during the entire construction period. Just above the bridge site there is a low island, and just below the bridge site the Central Georgia Railroad crosses the Flint River. A curve was necessary in the bridge to avoid crossing the east fork of the river on a skew and to remain within the right-of-way through the cemetery at the east end of the project. A careful study was made of four locations and it was finally decided to put a curve in the concrete approach.

Type of Structure

The bridge consists of 1,500 ft. of concrete approach, and 3 steel spans of 120 ft., each supported on concrete piers. The concrete approach consists of 35-ft. deck girder spans continuous over alternate bents. The girder decks are supported by concrete bents consisting of two columns resting on spread footings. Owing to the continuity of the spans, it was necessary to concrete 70 ft. at one pouring. This was easily effected after the concrete

EAST APPROACH, FLINT RIVER BRIDGE

VIEW OF THREE STEEL SPANS SUPPORTED ON CONCRETE PIERS

gang had been organized and practiced on the first two or three spans.

The concrete approaches are founded on spread footings, resting on coarse sand or stiff clay. The pressure per square foot on the footings is approximately 4,800 lb. No observable settlement occurred in any of the footings. A slight settlement occurred in three of the concrete decks, owing to the placing of false work on a fresh-made fill.

The river piers are founded on 2 cylinders 11 ft. in diameter and approximately 24 ft. long. These cylinders were placed by the open dredging process and were concreted through a tremie. Each cylinder is supported by 18 piles, having an average penetration of 27 ft. No special difficulty was experienced in placing the cylinders. Only one log was encountered. This was cut off by means of a sharpened railroad rail.

Surfacing

The original plans did not call for paving on the bridge. The concrete slab was thickened 1½ in. to care for wear and a paint coat was provided for. After construction was practically completed, it was decided to place a 2-in. surfacing of rock asphalt throughout the structure. This surfacing makes a good appearance and no special difficulty was experienced in placing it.

Conclusions

It was found in this structure that expansion joints should be provided in the railing at each panel point of the bridge. The railing should not be continuous over any point of support. The railing in the bridge at Montezuma has developed hair cracks at the points of flexure on each side of the bents over which the beams are continuous. It is thought that expansion joints over these points of support would have obviated these cracks. The cracks are not serious and would hardly be noticed except by an engineer.

In driving piling for foundations the inner circle of piles should be driven first, the work progressing from the center toward either edge; otherwise the piling at the center will be extremely hard to drive.

The contract price for this structure was approximately $180,000. The bridge was completed within the contract price, including the Kentucky rock asphalt surfacing. The bridge was finally inspected and accepted in February, 1920.

Contractors to Meet In New Orleans

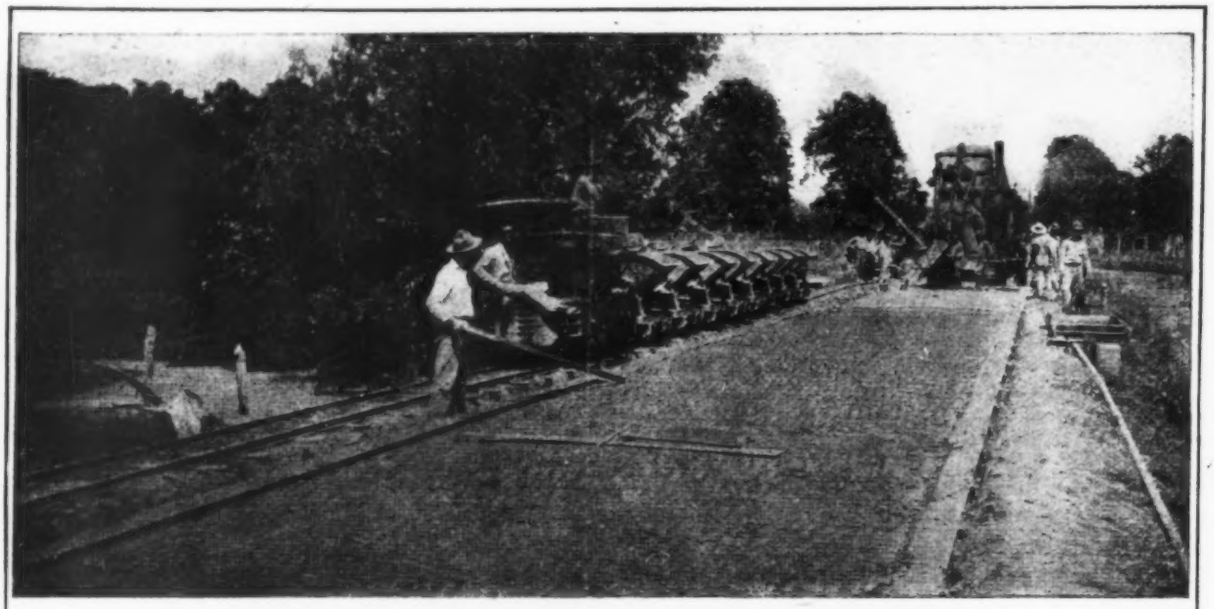
THE second national conference of the Associated General Contractors of America will be held at the Hotel Grunewald, New Orleans, January 25, 26 and 27. At this conference many questions of interest to the contractors of this country will be discussed and in addition to the business sessions there will be a program of entertainment that of itself will make the trip to the convention well worth while. The general good of the construction business in the United States will be advanced by a large attendance of representative contractors at the New Orleans conference. Those who attend will not have cause to regret the time so spent.

RAILROAD AND HIGHWAY COOPERATE

Arkansas Officials Realize That What Benefits the One Is Likely to Benefit the Other

THE theory that railroad companies are jealous of highway development seems to be knocked into a cocked hat by the Missouri Pacific railroad, and the evidence thereof is printed on this page. Arkansas is spending something like $80,000,000 for roads and one of the largest projects of the road parallels the Missouri Pacific road for a considerable distance. Those in charge of the railroad's affairs are broadminded enough to realize that anything which benefits the community as a whole benefits the railroad. And even though a certain amount of local traffic may be lost and in some cases, freight may be shipped by motor truck which ordinarily would go by rail, the gain is far greater than the loss. Good roads acting as feeders to a railroad system are big money makers.

On this page appears a reproduction of a page from a timetable issued by the Missouri Pacific. It shows a typical roadbuilding picture at the top and at the bottom goes into details concerning the Arkansas roadbuilding program. This sort of cooperation between railroads and highways is going to help Arkansas.



ROAD BUILDING IN ARKANSAS

That Arkansas has undertaken to spend $80,000,000 for nearly 8,000 miles of hard roads, a little more than $10,000 for each mile of road, and that the roads are to be built within five years, connecting all county seats, and meeting interstate roads, will give many people a new view of the State.

Arkansas will employ more than 60,000 laborers, about 4,000 teams, 150 civil engineers—not "practical road builders," but real engineers—during the construction period. Afterwards a small army will be employed in maintenance work.

By this system of roads Arkansas proposes to get out of forests and mud, to get up and down mountains, to get about between fertile farms and growing cities; to go "to and fro" quite generally and freely in the happiest of circumstances. The roads will cost a great deal, but everybody in Arkansas, it seems, understands that roads are worth a great deal, and nearly everybody is willing to spend a good deal to get a great deal in return. Cheap roads make a cheap State, and Arkansans do not feel that it pays for States to be backward in the matter of improvements. Arkansas is much more prosperous and productive than many persons imagine it to be, but a considerable part of its mineral and timber resources, and millions of fertile acres remain sequestered because of bad roads. These sources of wealth will be acquired by building hard roads. It is expected that the land under cultivation will be doubled and hundreds of square miles of virgin forest will become marketable timber.

Active construction work is being pushed on the Arkansas-Louisiana Highway, the largest single highway project in the United States, if not in the world, at this time. The total cost, including interest, will be approximately $4,650,000, and Federal aid has been secured to the amount of approximately 10% of its construction cost. There are 29 towns and 675,000 acres comprised in the district, as well as 200 miles of Missouri Pacific Railroad right-of-way

Beginning at Grady, in Lincoln County, the Highway follows the general direction of the Missouri Pacific Railroad, extending south through Desha and Drew Counties, forking at McGehee—one road passes through Ashley County and the other through Chicot County to the Louisiana State line.

113 miles of this Highway will be 2 inches of asphaltic concrete surface, placed on a 5-inch Portland cement concrete foundation.

With the Arkansas-Louisiana Highway complete by September, 1920, a continuous pike road will exist from Little Rock to the Louisiana State line, tapping one of the most fertile agricultural districts on the Continent.

The road to worth while investments.

Land values are still low. Why not investigate?

C. L. STONE,
Passenger Traffic Manager,
1650 Railway Exchange Building,
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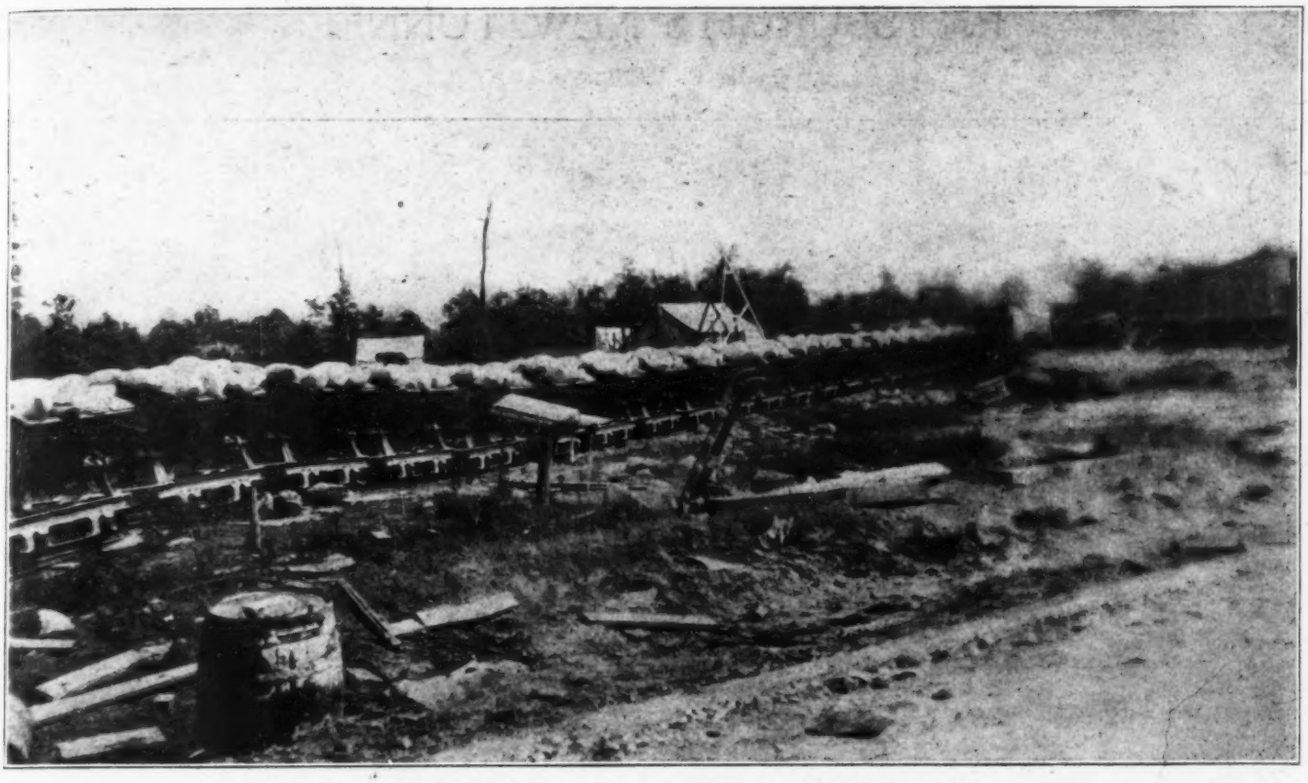
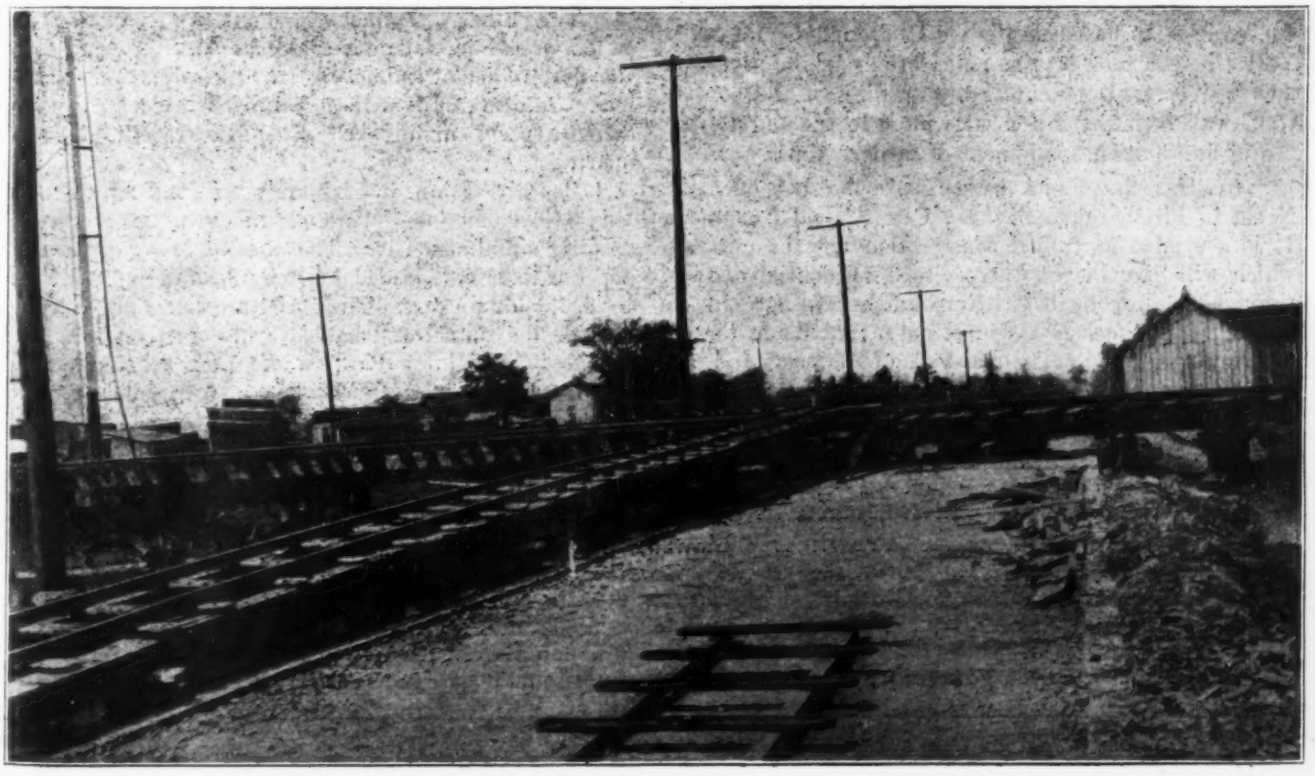


CEMENT IS MOVED FROM ONE PLANT SETUP TO ANOTHER IN ROAD CARS

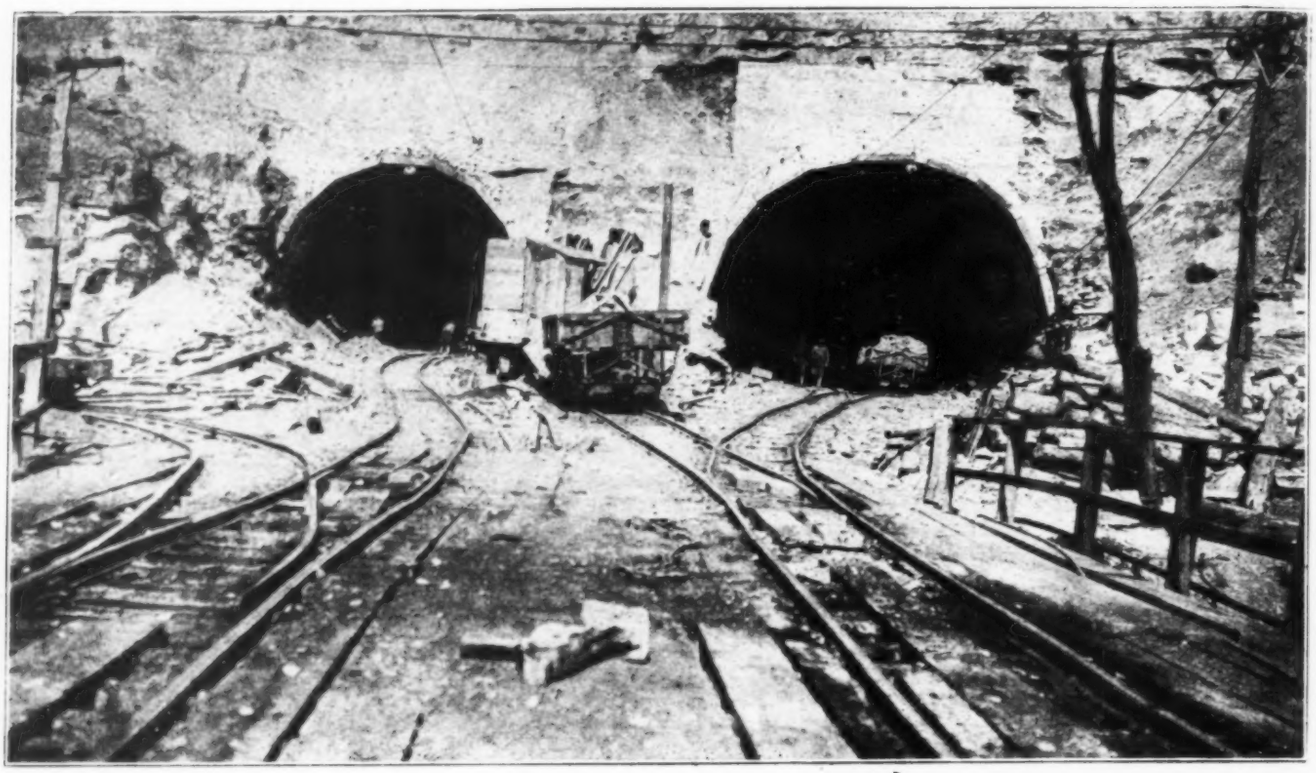
One section of the Arkansas-Louisiana highway which is referred to in the timetable is being paved by the Bryant Paving Company of Waterloo, Iowa. The new road consists of a 2-in. asphalt surface on a 5-in. concrete base. The section included in the Bryant contract is 58 miles long. Industrial haulage has been used on this job to get the materials from the railroad cars to the mixers and has shown its true value during the rainy season when work on other contracts was suspended because of the poor condition of the earth road over which the materials had to be hauled. On these jobs most of the work closed down for the last five months while on the Bryant job the work was kept going except for about 10 weeks in the spring when floods put the whole place under water and made it necessary to shut down. H. J. Haskell, superintendent of construction for the Bryant Company, gives the industrial track credit for the work done during the winter months. From October, 1919, to March, 1920, his company completed about 11 miles of road, while contractors on other jobs were doing nothing.



ONE WAY TO CROSS STANDARD GAUGE TRACK WITH ROAD TRACK

PITTSBURGH'S NEW TUNNELS

By C. P. Burton



THERE has been great progress in tunnel construction since the Hoosac Tunnel took its enormous toll of lives, time and treasure—192 lives, 24 years and $14,000,000. Nowadays, thanks to modern methods, machines and explosives, tunnel building is the work of but a comparatively short time, a mere incident in the career of engineer and contractor.

The other day work was started on a great tunnel for vehicles, to pass beneath the Hudson River into New York City. The event was noted briefly in the press and now will be forgotten until the opening of the bore to traffic calls brief attention once more to the engineering genius and efficient equipment of modern times.

A silver plated pick hangs above the desk of A. D. Neeld in Pittsburgh, Allegheny County's chief engineer. It is a symbol of tunnel construction now in progress, which will give the city access to a residential district, through the Monongahela River bluffs—twin bores, 5,700 ft. long. The pick is a symbol only, signalizing the act of breaking ground. The real tools of engineers and contractors—power shovels and side-dump cars—cannot be hung on walls.

Last year Mount Royal Tunnel, twin bores more than three miles long, leading into the heart of Montreal, was completed. The year before witnessed the completion, in record time, of Twin Peaks Tunnel in San Francisco, more than two miles long, giving access to a choice residential district—the largest municipally-owned tunnel in the world. Mountains no longer are barriers to progress.

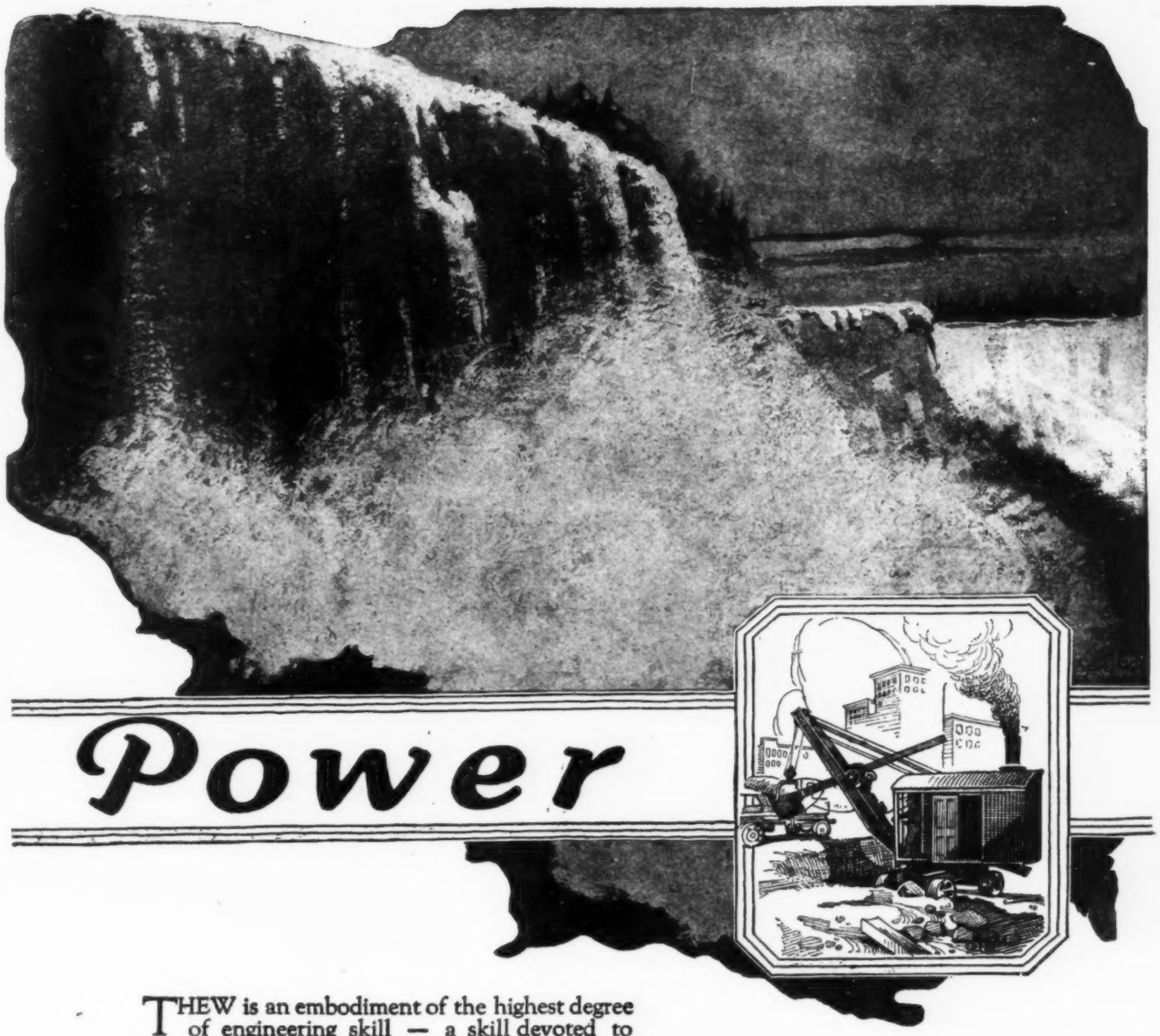
The Liberty Tunnels in Pittsburgh, as they are called, are of special interest because they are said to be the first vehicular tunnels of any size ever undertaken. They are being built with an estimated capacity of 1,690 vehicles per hour in each direction, traveling 100 ft. apart.

Booth & Flinn of Pittsburgh have the contract for this $4,600,000 job. Work on the two tunnels is proceeding simultaneously. The stone is shot down from top headings and loaded by power shovel into standard 4-yd. side-dump cars. These cars are assembled in trains outside the tunnel and hauled by locomotives to a huge ravine in McKinley Park, where they are dumped, as the foundation of a new boulevard, to become a part of Pittsburgh's boulevard system.

Successful Methods Income Tax Service

Readers of Successful Methods are reminded that they may obtain answers to questions concerning the income tax by writing to the Income Tax Service, Successful Methods, 140 South Dearborn street, Chicago, Illinois. This service is without charge to readers of this Magazine.

Although income tax returns do not have to be filed until March 1, there is no time like the present for getting them ready. The record of 1920 is complete. The job now is to get it into the shape in which the government wants it. If any questions puzzle you, ask Successful Methods.



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Inbred worth, coupled with unusually rugged operative power obtain for Thew owners permanent, dependable shovel service.

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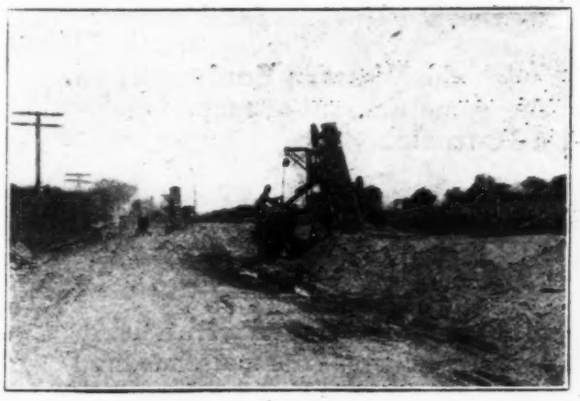
Roadbuilding Costs

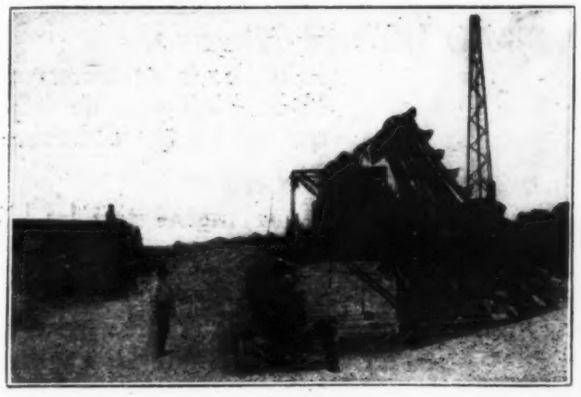
1921 promises to be the biggest roadbuilding year ever. Money is already appropriated, and cars, material and men will be available.

But the money will be wisely spent, competition keen, and the successful contractor will have to use modern machines and modern methods.

In selecting methods and equipment don't experiment. B-G machines have proved their worth and economy on many road jobs.

We have prepared a booklet "Cost Data of Barber-Greene Methods for handling Concrete Paving Materials," which pictures and describes different methods used last year. *Real* figures on cost are given—not what *can* be done, but what *has* been done. Get your copy.





Two uses for Barber-Greene Self-Feeding Bucket Loaders on road work.

Barber-Greene Company

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FIVE CONVINCING —REASONS—

for installing the Western Industrial-Railway, Batch-Box, Direct-Charging System on your Concrete Road Job:

No Wasted Time

You will be able to start work earlier next spring and will lose no time because of weather conditions during the season.

No Wasted Production Capacity

You can use a larger mixer. You could not work enough men back of a big modern mixer to keep it busy, using the old method.

No Wasted Material

It has been demonstrated that with the Western Equipment an 18-ft. slab can be laid with the same amount of materials required by the old method for a 16-ft. slab.

No Wasted Labor

Your mixer can be kept going with 15 to 20 fewer men than by the old method.

No Wasted Concrete

Your back-filling can be done with loose dirt, spread with a hand-shovel, instead of filling with extra-concrete—the usual method when material is distributed along the sub-grade.

Thrash the matter out with our Road Engineering Department this winter and be ready to start your mixer as soon as the temperature will permit, regardless of road conditions.

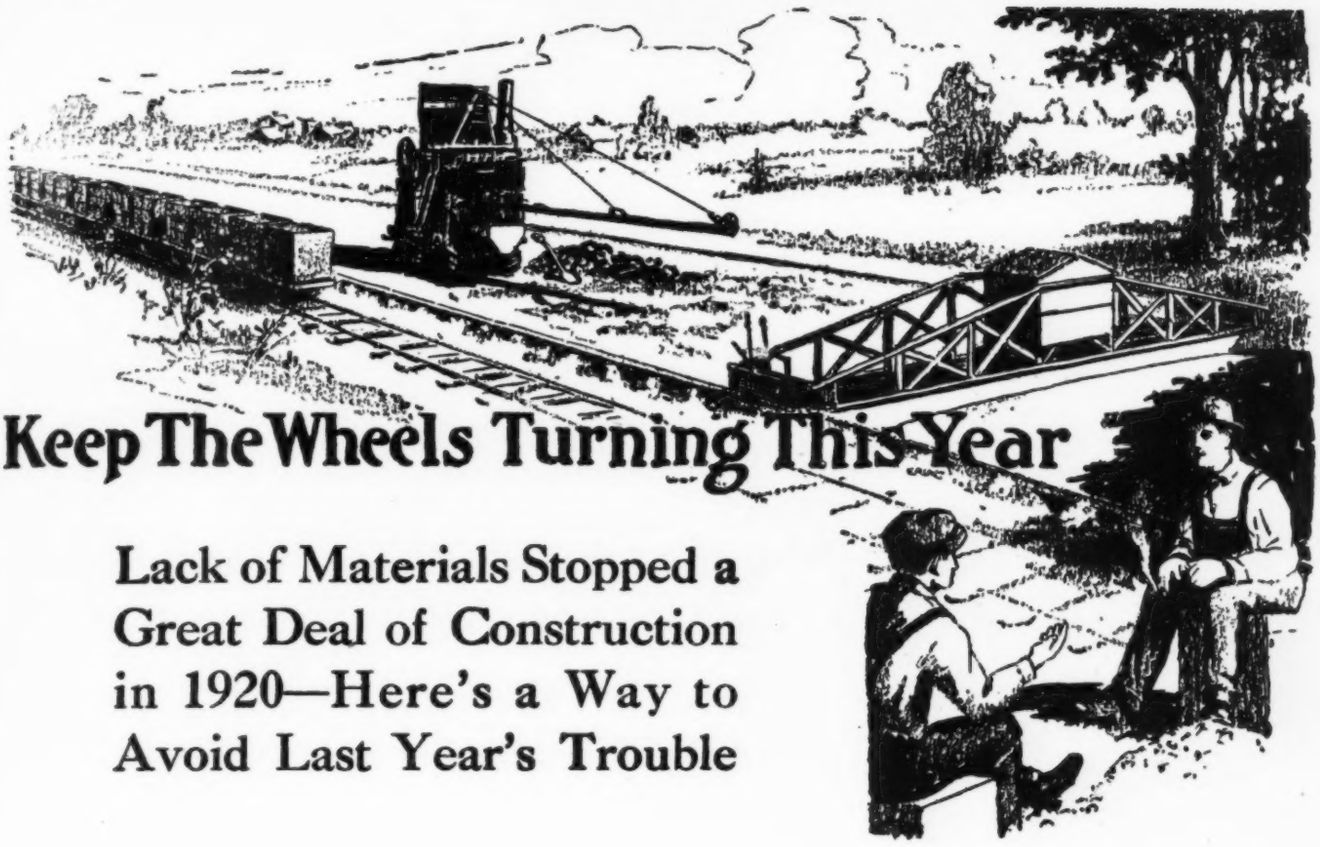
WESTERN WHEELED SCRAPER COMPANY

Earth and Stone Handling Equipment

Aurora, Illinois, U. S. A.

Founded 1877

ALLIED MACHINERY COMPANY OF AMERICA



Keep The Wheels Turning This Year

Lack of Materials Stopped a Great Deal of Construction in 1920—Here's a Way to Avoid Last Year's Trouble

THE "neck of the bottle," last year on general construction and road work was the ability of the railroads to deliver cement, sand, stone, etc., when needed.

Last year the "neck" got pretty badly corked up.

It's going to be pretty much the same next year in many localities.

But there seems to be a way out—that's to haul materials to the job in the season when most open top cars are available. And that time is during the winter and early spring.

Having large stock piles will insure starting work *on time* next year and being able to keep the job going *steadily*.

Of course this method has to be financed. But the certainty of *continuous* operation will more than offset any slight extra cost.

Have you talked this over with the people you're doing the work for? Your banker would be willing to help too, in most cases. In many cases a method of financing the purchase of material *now* can be worked out to the advantage of all concerned.

It means better satisfaction all around—and certainly it is to *your* advantage. Why not talk it over—*seriously?*

WRITE THE NEAREST OFFICE

NEW YORK CITY
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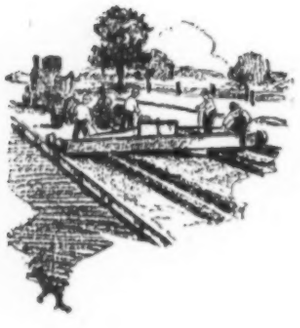
LAKEWOOD BUILT TO LAST

Lakewood Methods and Machines

ALMACO

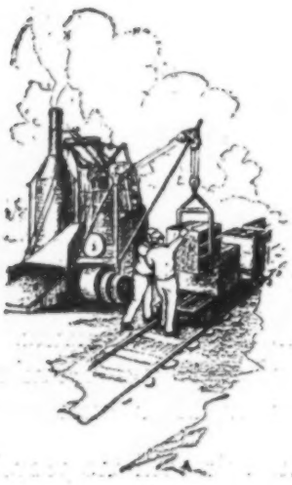
THE LAKEWOOD ENGINEERING COMPANY, CLEVELAND, U. S. A.

"Hit the Job" Hard



WHEN you "hit the job" next spring it's going to be mighty expensive if you have to stop to repair equipment.

Worn bearings, loose rivets or bolts, dirty magnetos, leaky gaskets, rust-eaten shafts that won't turn—they eat up the profits when they slow down the job.



Machines wear out—just like men. The best time to fix 'em is *before* they cause trouble.

This winter, when most of your plant is not in use, look it over carefully. Note the worn parts—order ***new ones now.***

A Free Trouble List

A "trouble list" has been prepared by our Field Inspection and Installation Department outlining the things to look for when inspecting a plant. This list covers all kinds of paving and construction equipment. It is not confined to a Lakewood plant alone. This list will be a handy reminder for you. A copy is yours for the asking.

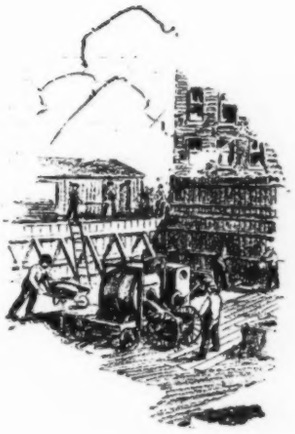
LAKEWOOD BUILT TO LAST

NEW YORK CITY PHILADELPHIA BOSTON DALLAS RICHMOND HOUSTON ATLANTA CHICAGO MILWAUKEE CLEVELAND

Lakewood

THE LAKEWOOD ENGINEERING

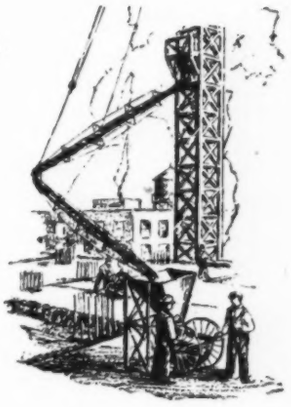
Next Spring—



WHAT new equipment will you need next season?

Possibly you aren't sure now of *all* the machinery you will require. But you're pretty certain to use some of it.

Place your order *now* for the plant you *know* you'll need. Be *sure* you have everything lined up to hit the job *hard* next spring.



Manufacturers can make more prompt shipment now than later in the spring.

Delay in getting your plant on the job may mean a great loss to you—one that you can avoid by action now.

Avoid the Rush of Spring. Do it now!

Let's go!

WRITE THE NEAREST OFFICE

MEMPHIS BUFFALO DETROIT SEATTLE ST. LOUIS PORTLAND INDIANAPOLIS MINNEAPOLIS KANSAS CITY DES MOINES PITTSBURGH SAN FRANCISCO LOS ANGELES

EXPORT-ALLIED MACHINERY CO. OF AMERICA, N.Y. CITY

Methods and Machines

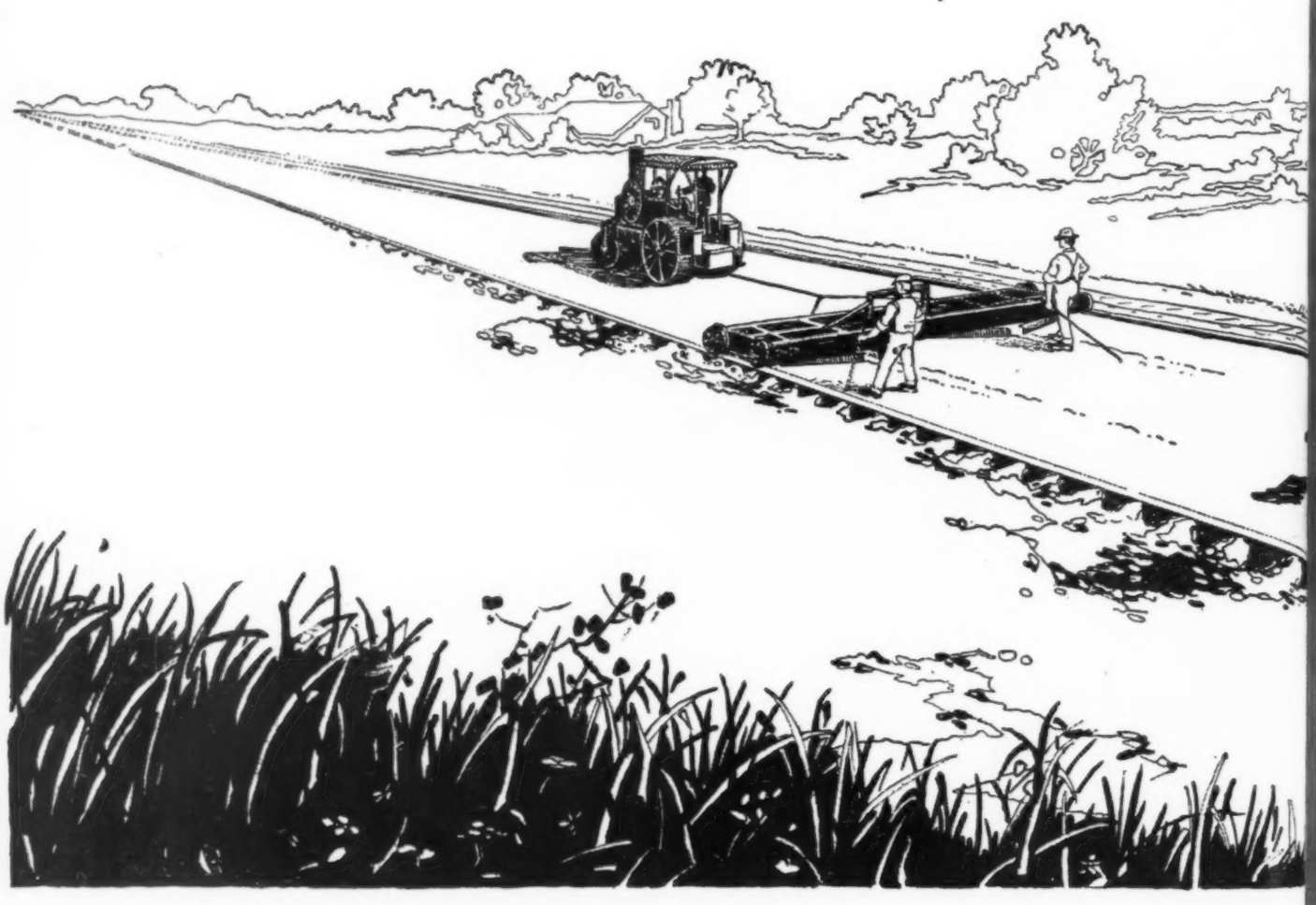
ALMACOA

COMPANY, CLEVELAND, U. S. A.

Solving the Contractor's

How the Lakewood Way

A LAKEWOOD ROAD PLANT is the result of a carefully thought-out plan. It is a group of standardized machines constructed to *work together* to produce maximum results with fewest men. It manufactures roads with the same certainty of speed and cost as a textile mill manufactures fabric.



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LAKEWOOD BUILT TO LAST

Lakewood

THE LAKEWOOD ENGINEERING

Credit Problem

Makes It Easier to Finance Road Jobs

THE success of a manufacturer depends on his annual "turnover"—on the volume of business going through his plant each year.

The success of a contractor depends to a certain extent on his annual "turnover"—on the volume of road that he builds each year.

To double or triple his "turnover" the contractor must build roads *quicker.*

This means turning over your money *twice as quickly*, Mr. Contractor. And operations are financed with *less working capital.*

In helping to increase *your* "turnover" Lakewood can help you.

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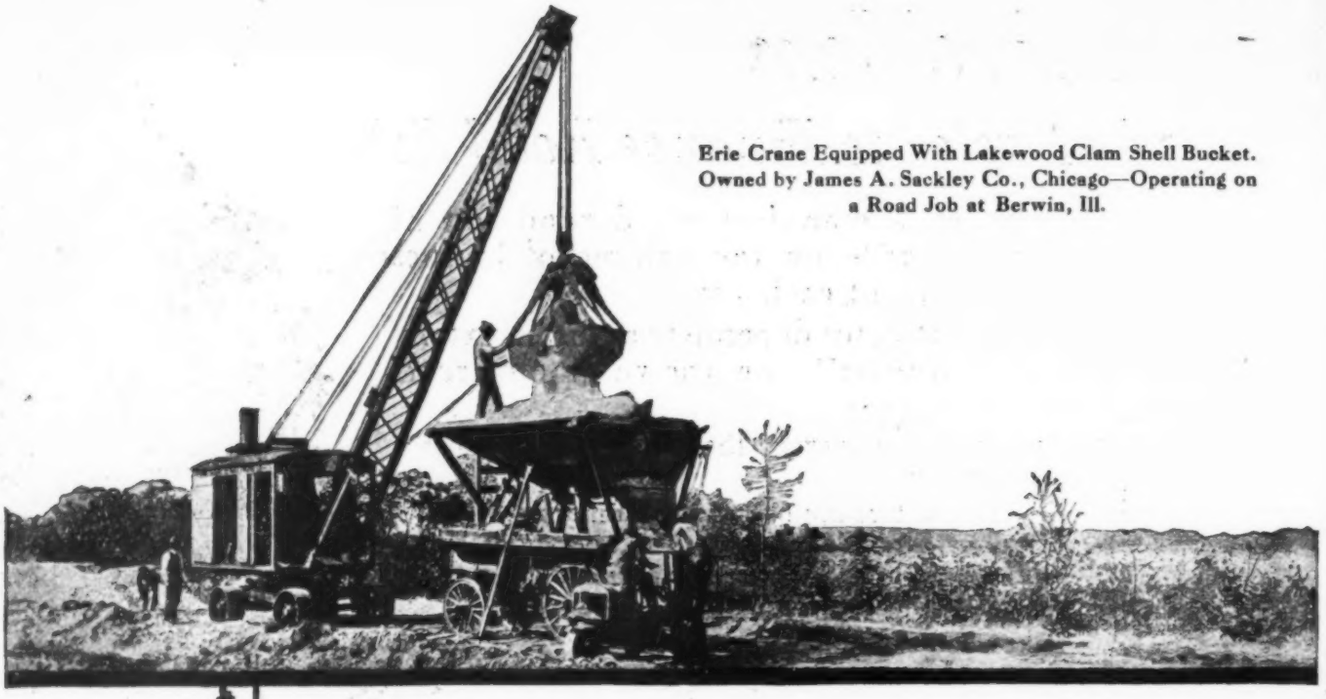

Erie Crane Equipped With Lakewood Clam Shell Bucket. Owned by James A. Sackley Co., Chicago—Operating on a Road Job at Berwin, Ill.

Move it Mechanically

Nothing Too Hard For A Lakewood Clam Shell

HARD coal or lumpy ore—fine sand or slack coal—sticky clay or furnace slag—you can handle any of them quicker and at less cost with a Lakewood Clam Shell Bucket.

It digs down as it closes—every load a full one. It opens wide when dumping—no time lost in discharging. The short overhaul cuts operating time between loads. The counterweight can be adjusted so that the digging thrust exactly suits the material. And—like every other Lakewood product—it is built to last.

¾ Yd. Handling Bucket $800
f. o. b. Cleveland

MORE DETAILS?—ASK FOR BULLETIN 26-B

WRITE THE NEAREST OFFICE

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